

Status Report on NASA Grant NGR 22-007-069

Period Dec. 1, <sup>1966</sup>1967 to May 31, 1967

Harvard  
Final Report

Harvard University

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This grant was requested primarily to make available funds for the purchase of a Perkin-Elmer recording infra-red spectrophotometer and accessory equipment for its use in studying organic extractives from ancient Precambrian rocks. Additional funds were allocated by the grant for graduate and undergraduate student assistance and for publication costs.

During the period covered by this status report a suite of organic sediments ranging in age from middle Paleozoic (270 million years) to early Precambrian (3,000 million years) have been subjected to hydrofluoric acid maceration and subsequent solvent extraction of the resulting organic residues. Infra-red absorbtion curves have first been determined on the benzene-methanol and n-heptane extractable eluates. The appearance of certain functional groups in respective IR spectra especially carbonyl and certain alkane and aromatic peaks<sup>has</sup> led to further separation of the extractable fractions by column chromatography and other techniques for more precise determination of specific compounds or species of organic molecules.

The initial data from the infra-red absorbtion spectra are of prime value in lending clues to the direction of further refinement in analysis of the extractable constituents of rocks. In all sediments examined in recent studies, even in rocks containing less than 1% of total organic matter it has been possible to detect C-H bonding. C=O bonding and commonly

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aromatic ring structure. Aromatic structure has not been found in rocks exceeding 2000 million years even though remnants of microorganisms (three dimensionally preserved) occur in the same.

In the course of the initial infra-red studies considerable attention was paid to the possible effects of laboratory and manipulative contamination of the geologic samples.

Work is continuing on a series of black shales collected in South Africa, western and central Australia ranging in age from early to late Precambrian.